

We claim:

1. A premixed charge compression ignition internal combustion engine, comprising:

an engine body;

a combustion chamber formed in the engine body;

an intake air system for delivering intake air, including at least one of air and a mixture of air and fuel, to said combustion chamber;

combustion history control system for controlling a combustion history of future combustion events to reduce emissions and optimize efficiency, said combustion history control system including a mixture autoignition property control system for varying an autoignition property of the mixture, said mixture autoignition property control system including a first fuel supply for supplying a first fuel to the engine and a second fuel supply connected to at least one of said intake air system and said combustion chamber for supplying a second fuel to the engine, said first fuel having a first autoignition property and said second fuel having a second autoignition property different from said first autoignition property; and

a processor adapted to control an amount of said second fuel delivered to said at least one of said intake air system and said combustion chamber to optimize engine operation.